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PATENT TRADEMARK OFFICE

CHAPTER II

**TRANSMITTAL LETTER
TO THE UNITED STATES ELECTED OFFICE (EO/US)
(ENTRY INTO U.S. NATIONAL PHASE UNDER CHAPTER II)**

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/RU99/00470	7 DECEMBER 1999	7 DECEMBER 1998

TITLE OF INVENTION

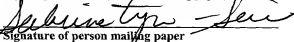
DEVICE FOR MEASURING THE VISCOSITY OF FLOWING MEDIA, VISCOSITY SENSOR AND METHOD FOR MANUFACTURING THE ELECTRODES OF A TACHOMETER FOR SAID VISCOSITY SENSOR

APPLICANT(S)

1. OLEG FEDOROVICH ORLOV
2. ALEXANDR VASILEVICH NENASHEV
3. VLADIMIR IVANOVICH BERG

Box PCT**Assistant Commissioner for Patents****Washington D.C. 20231****ATTENTION: EO/US****CERTIFICATION UNDER 37 C.F.R. 1.10****(Express Mail label number is mandatory.)**(Express Mail certification is optional.)*

I hereby certify that this correspondence and the documents referred to as attached therein are being deposited with the United States Postal Service on this date June 7, 2001, in an envelope as "Express Mail Post Office to Addressee," Mailing Label Number EL 728213340 US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

SABRINA TYSON-SIERRA*(type or print name of person mailing paper)*

 Signature of person mailing paper

WARNING: Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

***WARNING:** Each paper or fee filed by "Express Mail" must have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. 1.10(b).
 "Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will **not** be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.

(Transmittal Letter to the United States Elected Office (EO/US)—page 1 of 8) 13-18

**EXPRESS MAIL LABEL
NO.: EL 728213340 US**

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NOTE: *The completion of those filing requirements that can be made at a time later than 30 months from the priority date results from the Commissioner exercising his judgment under the authority granted under 35 USC 371(d). The filing receipt will show the actual date of receipt of the last item completing the entry into the national phase. See 37 C.F.R. §1.491 which states: "An international application enters the national state when the applicant has filed the documents and fees required by 35 USC 371(c) within the periods set forth in § 1.494 and § 1.495."*

WARNING: *Where the items are those which can be submitted to complete the entry of the international application into the national phase are subsequent to 30 months from the priority date the application is still considered to be in the international state and if mailing procedures are utilized to obtain a date the express mail procedure of 37 C.F.R. §1.10 must be used (since international application papers are not covered by an ordinary certificate of mailing - See 37 C.F.R. §1.8.*

NOTE: *Documents and fees must be clearly identified as a submission to enter the national state under 35 USC 371 otherwise the submission will be considered as being made under 35 USC 111. 37 C.F.R. § 1.494(f).*

1. Applicant herewith submits to the United States Elected Office (EO/US) the following items under 35 U.S.C. 371:
 - a. ☒ This express request to immediately begin national examination procedures (35 U.S.C. 371(f)).
 - b. ☒ The U.S. National Fee (35 U.S.C. 371(c)(1)) and other fees (37 C.F.R. § 1.492) as indicated below:

2. Fees

CLAIMS FEE	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
[]*	TOTAL CLAIMS	16 - 20 =	0	x \$ 18.00 =	\$
	INDEPENDENT CLAIMS	3 - 3 =	0	x \$ 80.00 =	
	MULTIPLE DEPENDENT CLAIM(S) (if applicable) + \$270.00				
BASIC FEE**	<p>[] U.S. PTO WAS INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY</p> <p>Where an International preliminary examination fee as set forth in § 1.482 has been paid on the international application to the U.S. PTO:</p> <p>[] and the international preliminary examination report states that the criteria of novelty, inventive step (non-obviousness) and industrial activity, as defined in PCT Article 33(2) to (4) have been satisfied for all the claims presented in the application entering the national stage (37 CFR 1.492(a)(4)) \$100.00</p> <p>[] and the above requirements are not met (37 CFR 1.492(a)(1)) \$690.00</p> <p>[x] U.S. PTO WAS NOT INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY</p> <p>Where no international preliminary examination fee as set forth in § 1.482 has been paid to the U.S. PTO, and payment of an international search fee as set forth in § 1.445(a)(2) to the U.S. PTO:</p> <p>[] has been paid (37 CFR 1.492(a)(2)) \$710.00</p> <p>[x] has not been paid (37 CFR 1.492(a)(3)) \$1,000.00</p> <p>[] where a search report on the international application has been prepared by the European Patent Office or the Japanese Patent Office (37 CFR 1.492(a)(5)) \$860.00</p>				
	Total of above Calculations				1,000.00
SMALL ENTITY	Reduction by ½ for filing by small entity, if applicable. Statement may also be filed. (note 37 CFR 1.9, 1.27, 1.28)				- 500.00
	Subtotal				500.00
	Total National Fee				\$500.00
	Fee for recording the enclosed assignment document \$40.00 (37 CFR 1.21(h)). (See Item 13 below). See attached "ASSIGNMENT COVER SHEET".				
TOTAL	Total Fees enclosed				\$500.00

*See attached Preliminary Amendment Reducing the Number of Claims.

- i. ☒ A check in the amount of 500.00 to cover the above fees is enclosed.
ii. ☐ Please charge Account No. _____ in the amount of \$ _____.
A duplicate copy of this sheet is enclosed.

****WARNING:** "To avoid abandonment of the application the applicant shall furnish to the United States Patent and Trademark Office not later than the expiration of 30 months from the priority date: *** (2) the basic national fee (see § 1.492(a)). The 30-month time limit may not be extended." 37 C.F.R. § 1.495(b).

WARNING: If the translation of the international application and/or the oath or declaration have not been submitted by the applicant within thirty (30) months from the priority date, such requirements may be met within a time period set by the Office. 37 C.F.R. § 1.495(b)(2). The payment of the surcharge set forth in § 1.492(e) is required as a condition for accepting the oath or declaration later than thirty (30) months after the priority date. The payment of the processing fee set forth in § 1.492(f) is required for acceptance of an English translation later than thirty (30) months after the priority date. Failure to comply with these requirements will result in abandonment of the application. The provisions of § 1.136 apply to the period which is set. Notice of Jan. 3, 1993, 1147 O.G. 29 to 40.

3. ☒ A copy of the International application as filed (35 U.S.C. 371(c)(2)):

NOTE: Section 1.495 (b) was amended to require that the basic national fee and a copy of the international application must be filed with the Office by 30 months from the priority date to avoid abandonment "The International Bureau normally provides the copy of the international application to the Office in accordance with PCT Article 20. At the same time, the International Bureau notifies applicant of the communication to the Office. In accordance with PCT Rule 47.1, that notice shall be accepted by all designated offices as conclusive evidence that the communication has duly taken place. Thus, if the applicant desires to enter the national stage, the applicant normally need only check to be sure the notice from the International Bureau has been received and then pay the basic national fee by 30 months from the priority date." Notice of Jan. 7, 1993, 1147 O.G. 29 to 40, at 35-36. See item 14c below.

- a. ☐ is transmitted herewith.
b. ☐ is not required, as the application was filed with the United States Receiving Office.
c. ☒ has been transmitted.
i. ☒ by the International Bureau.
Date of mailing of the application (from form PCT/IB/308): 29 June 2000.
ii. ☐ by applicant on _____
Date _____

4. ☒ A translation of the International application into the English language (35 U.S.C. 371(c)(2)):

- a. ☒ is transmitted herewith.
b. ☐ is not required as the application was filed in English.
c. ☐ was previously transmitted by applicant on _____
Date _____
d. ☐ will follow.

5. ☒ Amendments to the claims of the International application under PCT Article 19 (35 U.S.C. 371(c)(3)):

NOTE: The Notice of January 7, 1993 points out that 37 C.F.R. § 1.495(a) was amended to clarify the existing and continuing practice that PCT Article 19 amendments must be submitted by 30 months from the priority date and this deadline may not be extended. The Notice further advises that: "The failure to do so will not result in loss of the subject matter of the PCT Article 19 amendments. Applicant may submit that subject matter in a preliminary amendment filed under section 1.121. In many cases, filing an amendment under section 1.121 is preferable since grammatical or idiomatic errors may be corrected." 1147 O.G. 29-40, at 36.

- a. ☐ are transmitted herewith.
b. ☐ have been transmitted
i. ☐ by the International Bureau.
Date of mailing of the amendment (from form PCT/IB/308): _____.
ii. ☐ by applicant on _____
Date
c. ☒ have not been transmitted as
i. ☒ applicant chose not to make amendments under PCT Article 19.
Date of mailing of Search Report (from form PCT/ISA/210): 18 March 2000.
ii. ☐ the time limit for the submission of amendments has not yet expired.
The amendments or a statement that amendments have not been made will be transmitted before the expiration of the time limit under PCT Rule 46.1.

6. ☒ A translation of the amendments to the claims under PCT Article 19 (38 U.S.C. 371(c)(3)):
a. ☐ is transmitted herewith.
b. ☐ is not required as the amendments were made in the English language.
c. ☒ has not been transmitted for reasons indicated at point 5(c) above.
7. ☒ A copy of the international examination report (PCT/IPEA/409)
☒ is transmitted herewith.
☐ is not required as the application was filed with the United States Receiving Office.
8. ☐ Annex(es) to the international preliminary examination report
a. ☐ is/are transmitted herewith.
b. ☐ is/are not required as the application was filed with the United States Receiving Office.
9. ☐ A translation of the annexes to the international preliminary examination report
a. ☐ is transmitted herewith.
b. ☐ is not required as the annexes are in the English language.

10. ☒ An oath or declaration of the inventor (35 U.S.C. 371(c)(4)) complying with 35 U.S.C. 115
- a. ☐ was previously submitted by applicant on _____ Date
- b. ☐ is submitted herewith, and such oath or declaration
- i. ☐ is attached to the application.
- ii. ☐ identifies the application and any amendments under PCT Article 19 that were transmitted as stated in points 3(b) or 3(c) and 5(b); and states that they were reviewed by the inventor as required by 37 C.F.R. 1.70.
- c. ☒ will follow.

Other document(s) or information included:

11. ☒ An International Search Report (PCT/ISA/210) or Declaration under PCT Article 17(2)(a):
- a. ☒ is transmitted herewith.
- b. ☐ has been transmitted by the International Bureau.
Date of mailing (from form PCT/IB/308): _____
- c. ☐ is not required, as the application was searched by the United States International Searching Authority.
- d. ☐ will be transmitted promptly upon request.
- e. ☐ has been submitted by applicant on _____ Date
12. ☒ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98:
- a. ☐ is transmitted herewith.
Also transmitted herewith is/are:
☐ Form PTO-1449 (PTO/SB/08A and 08B).
☐ Copies of citations listed.
- b. ☒ will be transmitted within THREE MONTHS of the date of submission of requirements under 35 U.S.C. 371(c).
- c. ☐ was previously submitted by applicant on _____ Date
13. ☐ An assignment document is transmitted herewith for recording.

A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.

14. [x] Additional documents:
- a. [] Copy of request (PCT/RO/101)
 - b. [x] International Publication No. WO 00/37919
 - i. [] Specification, claims and drawing
 - ii. [x] Front page only
 - c. [] Preliminary amendment (37 C.F.R. § 1.121)
 - d. [] Other
- _____
- _____
15. [x] The above checked items are being transmitted
- a. [x] before 30 months from any claimed priority date.
 - b. [] after 30 months.
16. [] Certain requirements under 35 U.S.C. 371 were previously submitted by the applicant on _____, namely:
- _____
- _____

AUTHORIZATION TO CHARGE ADDITIONAL FEES

WARNING: *Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges if extra claims are authorized.*

NOTE: *"A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).*

NOTE: *"Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).*

[X] The Commissioner is hereby authorized to charge the following additional fees that may be required by this paper and during the entire pendency of this application to Account No. 12-0425.

[X] 37 C.F.R. 1.492(a)(1), (2), (3), and (4) (filing fees)

WARNING: *Because failure to pay the national fee within 30 months without extension (37 C.F.R. § 1.495(b)(2)) results in abandonment of the application, it would be best to always check the above box.*

[] 37 C.F.R. 1.492(b), (c) and (d) (presentation of extra claims)

NOTE: *Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must*

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only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.492(d)), it might be best not to authorize the PTO to charge additional claim fees, except possible when dealing with amendments after final action.

- [X] 37 C.F.R. 1.17 (application processing fees)
 [X] 37 C.F.R. 1.17(a)(1)-(5)(extension fees pursuant to § 1.136(a).
 [X] 37 C.F.R. 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 C.F.R. § 1.311(b).

NOTE: 37 C.F.R. 1.28(b) requires "Notification of any change in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying . . . issue fee." From the wording of 37 C.F.R. § 1.28(b): (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

- [] 37 C.F.R. § 1.492(e) and (f) (surcharge fees for filing the declaration and/or filing an English translation of an International Application later than 30 months after the priority date).



SIGNATURE OF PRACTITIONER

Reg. No.: 20302

JULIAN H. COHEN

(type or print name of practitioner)

Tel. No.: (212)708-1887

LADAS & PARRY

P.O. Address

Customer No.:00140

26 WEST 61ST STREET

NEW YORK, N.Y. 10023

09857662-002001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

[X] In re application of: O. F. ORLOV, ET AL.

Application No.:

Group No.:

Filed:

Examiner:

For:

[] *Patent No.:

Issue Date:

*NOTE: Insert name(s) of inventor(s) and title also for patent Where statement is with respect to a maintenance fee payment, also insert application number and filing date, and add Box M. Fee to address.

STATEMENT CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(c-f) and 1.27(b-d))

With respect to the invention described in

[] the specification filed herewith.

[X] application no. PCT/RU99/00470, filed 7 DECEMBER 1999.

[] patent no. _____ issued _____.

I. IDENTIFICATION AND RIGHTS AS A SMALL ENTITY

I hereby state that I am

(complete either (a), (b), (c) or (d) below)

(a) Independent Inventor

[] a below named independent inventor, and that I qualify as an independent inventor, as defined in 37 CFR 1.9(c), for purposes of paying reduced fees under Sections 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office.

(b) Noninventor Supporting a Claim by Another

[] making this statement to support a claim by

for a small entity status for purposes of paying reduced fees under Sections 41(a) and (b) of Title 35, United States Code. I hereby state that I would qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under Sections 41(a) and (b) of Title 35, United States Code, if I had made the above identified invention.

(c) Small Business Concern

[] the owner of the small business concern identified below;

[] an official of the small business concern empowered to act on behalf of the concern identified below:

Name of Concern ZAKRYTOE AKTSIONERNOE OBSHCHESTVO "VISKO TEKH"
Address of Concern RUSSIA, 113114, MOSCOW, UL. LETNIKOVSKAYA, D. 5, STR. 2
_____ and _____

that the above identified small business concern qualifies as a small business concern, as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Sections 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

(d) Non-Profit Organization

☐ an official empowered to act on behalf of the nonprofit organization identified below:

Name of Organization

Address of Organization

TYPE OF ORGANIZATION

☐ University or Other Institution of Higher Education

☐ Tax Exempt Under Internal Revenue Service Code (26 USC 501(a) and 501(c) (3))

☐ Nonprofit Scientific or Educational Under Statute of State of the United States of America

(Name of State _____)

(Citation of Statute _____)

☐ Would Qualify as Tax Exempt Under Internal Revenue Service Code (26 USC 501(a) and 501(c) (3)), if Located in the United States of America

☐ Would Qualify as Nonprofit Scientific or Educational Under Statute of State of the United States of America, if Located in the United States of America

(Name of State _____)

(Citation of Statute _____)

and that the nonprofit organization identified above qualifies as a nonprofit organization, as defined in 37 CFR 1.9(e), for purposes of paying reduced fees under Sections 41(a) and (b) of Title 35, United States Code.

II. OWNERSHIP OF INVENTION BY DECLARANT

I hereby state that rights under contract or law remain with and/or have been conveyed to the above identified

☐ person
(item (a) or (b) above)

☒ concern
(item (c) above)

☐ organization
(item (d) above)

EXCEPT, that if the rights held are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held (1) by any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, (2) any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or (3) a nonprofit organization under 37 CFR 1.9(e).

- ☒ no such person, concern, or organization
☐ person, concerns or organizations listed below*

*NOTE: Separate statements are required from each named person, concern or organization having rights to the invention as to their status as small entities. (37 CFR 1.27)

Full Name

Address

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

Full Name

Address

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

III. ACKNOWLEDGEMENT OF DUTY TO NOTIFY PTO OF STATUS CHANGE

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

IV. DECLARATION

(check the following item, if desired)

NOTE: The following verification statement need not be made in accordance with the rules published on October 10, 1997, 62 Fed. Reg. 52131, effective December 1, 1997.

NOTE: "The presentation to the Office (whether by signing, filing, submitting, or later advocating) of any paper by a party, whether a practitioner or non-practitioner, constitutes a certification under § 10.18(b) of this chapter. Violations of § 10.18(b)(2) of this chapter by a party, whether a practitioner or non-practitioner, may result in the imposition of sanctions under § 10.18(c) of this chapter. Any practitioner violating § 10.18(b) may also be subject to disciplinary action. See §§ 10.18(d) and 10.23(c)(15)." 37 CFR 1.4(d)(2).

- ☐ I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

V. SIGNATURES

(complete only (e) or (f) below)

(e)

NOTE: All inventors must sign the statement.

ORLOV Oleg Fedorovich

Signature of Inventor



Date: 05/05/2001

NENASHEV Alexandr Vasilevich

Signature of Inventor



Date: 05/05/2001

BERG Vladimir Ivanovich

Signature of Inventor



Date: 05/05/2001

or

(f)

NOTE: The title of the person signing on behalf of a concern or nonprofit organization should be specified.

Name of Person Signing (x) BUTKO Alexander Alexandrovich

Title of Person (x) Director General
(if signing on behalf of a concern or non-profit organization)

Address of Person Signing ZAKRYTOE AKTSIONERNOE OBSHCHESTVO "VISKO TEKH"

RUSSIA, 113114, MOSCOW, UL. LETNIKOVSKAYA, D. 5 STR. 2

SIGNATURE (x)



DATE (x) 05/05/2001



09/857662

DEVICE FOR MEASURING THE VISCOSITY OF FLOWING MEDIA,
VISCOSITY SENSOR AND METHOD FOR MANUFACTURING
THE ELECTRODES OF A TACHOMETER FOR SAID VISCOSITY SENSOR

Field of the Invention

531 Rec'd PC

07 JUN 2001

The present invention relates to devices for measuring the viscosity of flowing media, wherein said devices include a viscosity sensor of the rotating type. This invention is used for measuring with increased accuracy the viscosity of insignificant volumes of Newtonian and viscoplastic media in which the temperature and pressure vary in a wide range.

Description of the Prior Art

Known in the art is a system for measuring the viscosity of flowing media, comprising a digital converter, a pulse discriminator, a logic device, an electronic switch, a forming device and a logic switching circuit, wherein the input of said converter is connected to the output of the logic frequency comparison device through said pulse discriminator and the output of said logic frequency comparison device is connected through said electronic switch to the rotor of an electric motor of the viscosity sensor inner receiving cylinder, said cylinder having an incremental shaft rotational speed sensor fixed on its shaft, and said sensor is connected through said forming device and an incremental correction device to one input of said logic frequency comparison device wherein the second input is connected to the output of said logic switching circuit. (SU,A, 1276957, IPC G01N 11/14, 1986.)

The known systems for measuring the viscosity of flowing media under high pressure and temperatures that use a viscosity sensor of rotating type are, like that described above, rather complex and, consequently, involve high costs; also they have a limited measurement range and a measuring chamber of great volume as well as do not ensure high measurement accuracy to meet users' needs.

The object of the present invention "Device for measuring the viscosity of flowing media" is to provide a portable and inexpensive device for measuring the viscosity of flowing media, in particular, liquids, by the viscosity sensor rotor speed measured with high accuracy and the rotor torque set with high accuracy. Technically, this invention allows to raise the measurement accuracy to .1 - .5 % in the viscosity range from .01 sP to 30 P for liquids which may be under pressures of 500 MPa or

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more, at temperatures from 0 °C to 160 °C or more, and comprises the rotating sensor measuring chamber the working volume whereof does not exceed 1.5 mL.

The above-said technical result is attained by a known device for measuring the viscosity of flowing media, which includes a viscosity sensor realized from an asynchronous motor and having a measuring chamber, the output of said viscosity sensor being connected to the input of an information-signal generation unit and said measuring chamber being connected through the inlet port to a high-pressure pump, and a tachometer having its rotor rigidly connected to the rotor of said asynchronous motor, both being arranged in said measuring chamber. Said information-signal generation unit is in the form of an AC bridge circuit comprising shoulders which are identical and are each made of a resistor and of a capacitor of variable capacity connected in series. The capacitors of variable capacity are formed by the electrodes of the tachometer stator and by at least one pole of the rotor thereof. This pole is connected to one of the poles of the supply bridge of the generator through a capacitor with fixed capacity that is defined by the surface of the rotor of the asynchronous motor and by the wall of the body of the viscosity sensor. The other pole of the generator is galvanically connected to the common point of the resistors of the different shoulders of the AC bridge circuit, the other ends of the resistors being connected to the inputs of a phase-sensitive converter.

Alternative embodiments of the invention are possible, wherein it is advisable that:

- the generator should be connected to the resistors through a potentiometer;
- the generator should be made controllable by output signal frequency and amplitude;
- the information-signal generation unit should be provided with a low-frequency filter and an amplifier connected in series, the input of the low-frequency filter being connected with the output of a phase-sensitive converter;
- the device should include a temperature control system made in the form of a thermostat connected to a temperature control chamber arranged in the body of the viscosity sensor, a digital multimeter having its signal inputs connected to said amplifier of the generation unit, a pressure gauge hydraulically connected to a high-pressure pump, and a sensor of flowing media temperature in the measuring chamber,

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the outputs of said digital multimeter being connected to a controllable power supply of the stator of the asynchronous motor, to said high-pressure pump and to said thermostat for enabling to control, respectively, speed of the rotor of said asynchronous motor, pressure and temperature of flowing media in said measuring chamber.

Known in the art is a viscosimeter of rotating type wherein the rotor having a driven magnet fixed thereto is installed on supports within a hermetic tube, and torque is transferred to said driven magnet from the driving magnet installed on the shaft of an electromechanical drive. A sensor with variable magnetic resistance measures rotational speed of said driving magnet, which in steady-state motion is equal to rotational speed of said driven magnet, said driven magnet being displaced to a small angle relative to said driving magnet by action of viscous friction on said rotor. For measuring said angle there is the second sensor with variable magnetic resistance activated by a ferromagnetic element installed on the rotor. The phase difference between signals generated by both sensors is directly proportional to viscosity. (US Pat. No. 4499753, IPC⁶ G01N 11/14, 1985.)

One disadvantage of said viscosimeter of rotating type is that it does not allow significant mismatch of the poles of the driving and driven magnets that limits the measurement range, forcing either to change the rotational speed of the electromechanical drive shaft or to fit the driving and driven magnets depending on the viscosity range of a measured liquid.

Moreover, it is necessary to move to a significant distance the sensor with variable magnetic resistance activated by the ferromagnetic element off the driving and driven magnets to avoid magnetic attraction, which results in an increase in the volume of the chamber filled with a measured liquid and, consequently, in an increase in the volume of the liquid.

Known in the art is a viscosity sensor comprising a body with a measuring chamber, an asynchronous motor wherein the stator is located in the body and the rotor is located in said measuring chamber and is installed on supports, said measuring chamber being connected to the inlet port and the outlet port. The stator of the asynchronous motor is located in the body outside the piping and is separated

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from the liquid-containing cavity by the body wall. In a known sensor taken as the prototype viscosity value is judged by the power consumed by the stator. (SU, A, 135691, IPC⁶ G01N 11/14, 1960.)

A disadvantage of the said sensor is the lack of specific information on the rotational speed of the rotor, which does not allow fine calibration of viscosity sensors. Moreover, the utilized bearings display a higher friction torque which instability effect on the consumed power rate is impossible to separate from the effect of a change in the viscosity of a liquid.

Another disadvantage of the known viscosimeter is also that the direct contact of the body wall with the stator results in measurement errors due to a deformation the stator resulting from a pressure change in the piping.

The object of the present invention is to provide a viscosity sensor allowing measuring with high accuracy the viscosity of insignificant volumes of flowing media in which the temperature and pressure vary in a wide range.

The above-said technical result is attained by a known viscosity sensor realized from a body with a measuring chamber, an asynchronous motor wherein the rotor is installed on supports and arranged in said measuring chamber connected to the inlet and outlet ports, said body being made as three portions - one central and two lateral ones, the temperature control chamber of the above-said temperature control system and the stator of the asynchronous motor are arranged in the central portion of the body, and said supports of the rotor of said motor are arranged in the lateral portions of the body, the rotor of the tachometer being rigidly and galvanically connected to the rotor of the asynchronous motor and being arranged in the central portion of the body, and said supports being made so as to give possibility of electrically isolate the rotor from the body.

Alternative embodiments of the invention are possible, wherein it is advisable that:

- the stator of the tachometer should be made in the form of at least two electrodes galvanically isolated from each other and arranged opposite its rotor made with at least one pole arranged so as to give possibility to form, with said electrodes, capacitors with variable capacity modulated by the pole when the rotor rotates;

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- the central portion and the lateral portions of the body should be made of a chemically inactive and non-magnetic material with low conductance;
- the rotor of the asynchronous motor should be made of a chemically inactive and non-magnetic material having low density and high conductance;
- in a case the rotor of the tachometer is made with two or more poles, the angular dimension of each of them should be made equal to the angular dimension of the gaps between them;
- each electrode should be made as two groups of plates, said plates in each group being galvanically connected therebetween;
- the gaps between the poles of the rotor should be filled with a dielectric material with the possibility of forming a cylinder.

Known in the art is a method of manufacturing electrodes of a tachometer, consisting in making plates mechanically and fixing them on the dielectric surface of the stator of the tachometer, the plates in each group being galvanically connected therebetween.

The making of the stator of a tachometer according to the known method is technologically difficult and does not ensure compliance with the requirements to the error level of the portions geometry, which significantly lowers the accuracy of a sensor on the whole.

The object of the invention "Method for manufacturing the electrodes of a tachometer" intended for a viscosity measuring sensor is to raise the accuracy and manufacturability of the stator of a tachometer as well as lowering the dimensions and weight thereof, which contributes, when operating the sensor, to raising the accuracy of measurements of the viscosity of flowing media, especially in cases of their insignificant volumes.

In order to achieve the above-said object and get the described technical result in a known method of manufacturing the electrodes of a tachometer, consisting in making, on the stator, said electrodes in the form of combs, the prongs of one of them being arranged in the gaps between the prongs of another one, said electrodes are made in the form of foil which is attached to a polymer film and covered, in segments of its surface corresponding to the form of said electrodes, with a chemically protective substance; afterwards the surface of the film with the foil attached thereto is

treated by etching and the products of etching are removed; afterwards the electrodes are insulated by thermally bonding thereto a film of a hermetic dielectric material; afterwards the two-layer film with said electrodes is rolled up to get the tachometer stator of cylindrical form.

Alternative embodiments of the invention are possible, wherein it is advisable that:

- the boundary areas of the film after making the stator of cylindrical form should be connected therebetween;
- the boundary areas of the film should be connected by overlapping or butting them;
- it is advisable to use a polymer compound as the said dielectric material.

Brief Description of the Drawings

Figure 1 is the electrical schematic diagram of the device for measuring the viscosity of flowing media.

Figure 2 is the functional scheme of an embodiment of the digital multimeter intended for processing of the output signal of the device for measuring the viscosity of flowing media.

Figure 3 is a cross-sectional view of the sensor for measuring the viscosity of flowing media.

Figure 4 is Section A-A for Figure 3.

Figure 5 is Section B-B for Figure 3.

Description of the Preferred Embodiments

A device for measuring the viscosity of flowing media, in particular, a liquid, comprises a viscosity sensor 1 (Figs. 1, 3, 4, 5) made with a measuring chamber 2 wherein the rotor 3 of an asynchronous motor is arranged, being rigidly and galvanically connected to the rotor 4 of a tachometer.

The output of the sensor 1 is connected to an information-signal generation unit 5, which characterizes the viscosity of an investigated liquid, and the measuring chamber 2 is connected through its inlet port 6 with a high-pressure pump 7 and through its outlet port 8 with a sensor 9 of temperature of an investigated liquid 10 in the measuring chamber 2.

The body of the sensor 1 (Fig. 1) consists of three portions, the central one 11 and the two lateral ones 12 and 13 wherein the inlet port 6 and the outlet port 8 are

arranged. All said portions of the body are made of a chemically inactive and non-magnetic material with low conductance. It enabled to raise the chemical resistance of the measuring chamber 2 to attacks of corrosive media. Supports 14 of the rotor 3 of an asynchronous motor, which is arranged in the central portion 11, are located in the lateral portions 12, 13 of the body. For the purpose of raising accuracy at the expense of reducing instability effect of friction torque the supports 14 are realized from stone supports or from precision radial thrust bearings.

The measuring chamber 2 in the central portion 11 (Figs. 3, 4) includes the stator 21 of a tachometer which rotor 4 is rigidly and galvanically connected to the rotor 3 of an asynchronous motor, forming a single component. The stator of said asynchronous motor is arranged in the central portion 11 of the body with the possibility of enclosing the rotor 3.

An information-signal generation unit is made in the form of an AC bridge circuit comprising shoulders which are identical and are made of capacitors 16, 17 with variable capacity and of resistors 18, 19. The capacitors 16, 17 with variable capacity are formed by the electrodes 20 of the tachometer stator 21 and by at least one pole 22 of the rotor 4 of the tachometer. The said pole is connected to one of the poles of the supply bridge of the generator 24 through a capacitor 23 with fixed capacity which is defined by the surface of the rotor 3 of an asynchronous motor and by the wall of the central portion 11 of the body of the viscosity sensor 1. The other pole of the generator is galvanically connected to the common point of the resistors 18, 19 of the different shoulders of the AC bridge circuit, the other ends of said resistors 18, 19 being connected to the inputs of a phase-sensitive converter 25.

The generator 24 may be made controllable and is connected to the ends of the resistors 18, 19 through a potentiometer 26.

A low-pass filter 27 and an amplifier 28 are connected in series and to the output of the phase-sensitive converter 25. A signal from the amplifier 28 goes to the signal input of a digital multimeter 29 made with three outputs connected to the asynchronous motor, a high-pressure pump 7 and a thermostat 30, giving the possibility of controlling, respectively, the speed of rotation of the rotor 3 of the asynchronous motor, pressure and temperature of a flowing media in the measuring

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chamber 2. A pressure gauge 31 and a flowing media temperature sensor 9 in the measuring chamber 2 are used for measuring pressure and temperature.

The viscosity sensor 1 includes a temperature control system made in the form of a thermostat 30 connected to a temperature control chamber 32 with a heat carrier. The temperature control chamber 32 is arranged in the central portion 11 of the body and is intended for maintaining a stable temperature in the measuring chamber 2. The temperature of an investigated liquid is controlled by the thermostat 30 according to signals from the temperature sensor 9 arranged in the measuring chamber 2 for the purpose of ensuring the value set for measuring temperature of an investigated liquid. The thermostat 30 may be, e.g., a circulation thermostat made by Petrotest Instruments GmbH & Co KG, which adjusts the temperature of an investigated liquid to a set value "T". The temperature sensor 9 is used as a feedback device, which monitors the actual temperature "T_i" of an investigated liquid. The thermostat 30 compares said actual temperature to the set temperature value "T", changes the heat carrier temperature in the temperature control chamber 32 to a corresponding temperature "T_{const}" that ensures the set temperature value "T" of an investigated liquid 10.

The stator 21 of a tachometer is made in the form of at least two electrodes 20 galvanically isolated from each other and arranged opposite the rotor 4 of the tachometer made with at least one pole 22. Said rotor 4 of the tachometer is arranged so as to give possibility to form, with said electrodes 20, capacitors 16, 17 with variable capacity modulated by the pole 22 when the rotor 4 of the tachometer rotates.

In a case where the rotor 4 of the tachometer is made with two or more poles 22, the angular dimension of each of them is made equal to the angular dimension of the gaps between them.

In order to raise the modulation frequency as well as to reduce the axial dimensions of the measuring chamber 2, the electrodes 20 (Fig. 4) are made in the form of groups of electrode plates 33, 34 galvanically connected therebetween in each group, the number of poles 22 on the rotor 4 of the tachometer being made equal to the number of plates in a group. The electrodes 20 are connected by their terminals to the inputs 35 that are hermetically arranged in the central portion 11 of the body.

Figure 4 is a cross-sectional view of an embodiment of the central portion 11 of the body of the sensor 1 comprising a bore wherein an insulating bushing 36 is arranged.

The electrode plates 33, 34 are connected to the terminals of the hermetic high-pressure inputs 35, and the said inputs are insulated with a dielectric material, such as a polymer compound.

The electrode plates 33, 34 are made in the form of combs, the prongs of one of them are arranged relative to the prongs of the other combs with a shift along the axis of the rotor with the possibility of forming, in interacting with its poles, information capacities of differential type.

According to the invention, the electrodes are made as follows. The electrodes 20 (Figs. 4, 5) are made in the form of foil that is attached to a polymer film 37. The surface of the electrodes is covered with a chemically protective substance; afterwards the surface of the film 37 with the foil attached thereto is treated by etching; afterwards the electrodes are insulated by thermally bonding thereto a film 38 of hermetic dielectric material. Afterwards the films bonded to each other are rolled up to get the tachometer stator 21 of cylindrical form and are placed into the bushing 36.

The boundary areas of the films after making the stator of cylindrical form are connected therebetween by overlapping or butting them.

Figure 4 is a cross-sectional view of the rotor 4 of the tachometer, which comprises four poles 22. The gaps between the poles 22 are filled with a dielectric compound 39 with the possibility of making a cylindrical form corresponding to the form of the rotor 4 arranged with a clearance inside the stator 21 made as described above.

Such solution enables to raise the accuracy of measurements at the expense of reducing hydraulic loss effect on vortex formation.

Such a system gives a possibility of measuring the viscosity of an investigated liquid at high temperatures and pressures in the measuring chamber of insignificant volume.

Figure 2 is a functional scheme of an embodiment of a digital multimeter 29, which comprises a combined "volt - ampere" meter 40, an input device 41, an AD converter 42, a RAM device 43, a microprocessor 44, an indicator panel 45, a ROM device 46, a keyboard 47, a control bus 48, an address bus 49, a data bus 50 and an interface 51.

The digital multimeter 29 with the built-in microprocessor 44 is a general-purpose multifunctional metering device enabling to detect and monitor parameters of electric signals coming to its signal inputs from a temperature sensor 9 and a pressure gauge 31. Moreover, proceeding from results of measuring and monitoring parameters of said input signals, the digital multimeter 29 may set and change operating modes of the device according to a given program.

The input device 41 is intended to convert input signals into identical electric signals standard in their forms and ranges of variance.

The AD converter 42, jointly with the RAM device 43, in quantizing each instantaneous value of an analog waveform coming to its input from the output of the input device 41, represents it by the nearest standard value and instruments analog electric input signals into digital code.

The microprocessor 44 is intended to: perform autocalibration of supply voltages and measuring means of the device and autosetting of measurement limits for the parameters monitored; control the process of measuring the viscosity of an investigated liquid under a given program; perform statistical manipulation of data on the measured viscosity of a liquid (estimate, under a known algorithm, an average value of a measured parameter, its variance and standard deviation, etc.); control the process of visualization and registration of received data; exchange information flows with peripheral devices; perform diagnostics of the functional units.

The indicator panel 45 is intended for digital presentation of received data on the viscosity of an investigated liquid as well as for visualization of characters and words informing the operator of the procedure of his further actions.

The ROM device 46 is intended to store the resident and modified programs.

The control keyboard 47 is intended for inputting a work program into the ROM device 46 in a symbolic language.

The interface 51 is intended for interfacing the units being included into the digital multimeter 29 as well as the communication links thereof, namely, the control bus 48, the address bus 49 and the data bus 50 that ensures the translation of the measurement results.

The viscosity sensor operates as follows.

In accordance with a program stored in the memory of the digital multimeter 29, in a time interval "t" after switching on the power supply, all the means of the device become ready to routine operations in the continuous mode of measuring the

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viscosity of a liquid 10. The adjustable high-pressure pump 7 and the thermostat 30 ensure a set pressure "P" and temperature "T" of the liquid 10 in the measuring chamber 2.

The high-frequency generator 24 powers the bridge circuit 15 with alternating sine-wave voltage of a frequency of app. 10 kHz.

By the time "t" at a set pressure "P" and temperature "T" the rotational frequency "f" of the tachometer rotor 4 in an investigated liquid 10 becomes stable. A stable frequency 'f' means that a calibration torque applied to the rotor 3 from the stator 52 of the asynchronous motor becomes a balanced braking torque acting on the rotor thereof, which represents the sum of the braking torque in the supports and the moment of viscous friction forces generated by an investigated liquid 10 at a given rotational frequency of the rotor 4. The friction torque value in the supports is taken into account proceeding from the results of calibrating the rotary sensor, and in this condition the rotational frequency "f" of the rotor 4 may be regarded as inversely proportional to the viscosity of an investigated liquid 10.

The rotational frequency "f" of the tachometer rotor 4 is varied by the information-signal generation unit (Fig. 1) realized from a measuring AC bridge circuit 15, a phase-sensitive converter 25 and a low-pass filter 27. It is done as follows. Interaction of the poles 22 with the electrodes 20, while the tachometer rotor 4 is rotating, results in harmonic modulation on the same frequency "nf" of the capacities of the capacitors 16 and 17, where "n" is the number of poles 22 of the tachometer rotor 4. The capacitors with variable capacity 16 and 17 are formed, respectively, by the electrodes 20 interacting with the poles 22. Modulation of variable capacities of the capacitors 16 and 17 occurs in antiphase. A signal resulting from modulation of variable capacities of the capacitors 18 and 19 is fed to the input of the phase-sensitive converter 25. From the output of the phase-sensitive converter 25 a detected harmonic electric signal of an "nf" frequency is applied through the low-pass filter 27 to the input of the DC amplifier 28. From the output of the DC amplifier 28 an amplified signal of an "nf" frequency is applied to the input device 41 of the digital multimeter 29. The input device 41 of the multimeter 29 transforms such signals into identical electrical signals of standard form, i.e., signals with amplitude that is constant and does not depend on relative permittivity of a liquid 10. Normalized signals are applied to the input of the AD converter 42 of the multimeter 29. The AD converter 42, jointly with the RAM device 43, in quantizing each

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instantaneous value of an analog waveform coming to its input from the output of the input device 41, represents it by the nearest standard value and instruments analog electric input signals into digital code. In the result, electrical signals are applied to the input of the microprocessor 44 of the digital multimeter 29 in the form of recurring codes - groups of equidimensional pulses of high standard frequency.

The duration t_k of each pulse, as measured by counting the number of time marks included therein, is inversely proportional to frequency "f" and directly proportional to the viscosity of an investigated liquid 10.

The viscosity value " η " is calculated by the microprocessor 44 in accordance with the following relation:

$$\eta = \eta_0 J\phi^2 t_k \quad \dots \quad (1)$$

where " $J\phi^2$ " is an active in each phase value of current powering the tachometer stator 4, which is set by the microprocessor, and " η_0 " is the constant certified for each sensor 1, which is determined in the result of calibration thereof.

The data, thus obtained on the parameter of an investigated liquid 10, may be supplemented with results of statistical manipulation thereof. All such information as a whole or in part may be presented, if necessary, on the indicator panel 45 as well as registered by the RAM device 43 and the ROM device 46.

Errors like zero drift and instability of a scale parameter are minimized by the calibration operation.

Precision calibration, which allows for, in particular, the effect of the geometric parameters of the sensor 1 as well as the effect of friction in the supports 14 of the rotor 3 of an asynchronous motor, is conducted on the basis of the relation (1) by separately measuring a known viscosity of any liquid for which the viscosity coefficient at definite pressure and temperature is known with the required accuracy.

A high accuracy level for the sensor is ensured, principally, by utilizing therein low-noise insulating supports 14 in the form of stones or precision radial thrust bearings in an insulating race for suspending the rotor 3 of an asynchronous motor, which is made integral with the tachometer rotor 4, as well as by reducing measurements of rotational frequency of the tachometer rotor 4 to an extra accurate type of measurements - digital measurement of time intervals.

Industrial Applicability

The invention complies with the "industrial applicability" criterion, since it can be worked with the use of existing production facilities and known technologies.

What is claimed is:

1. A device for measuring the viscosity of flowing media comprising a viscosity sensor realized from an asynchronous motor and having a measuring chamber, the output of said viscosity sensor being connected to the input of an information-signal generation unit and said measuring chamber being connected through the inlet port to a high-pressure pump, *characterized in that* the viscosity sensor includes a tachometer having the rotor thereof rigidly connected with the rotor of said asynchronous motor, both rotors being arranged in the measuring chamber of said sensor, said information-signal generation unit is made in the form of an AC bridge circuit comprising shoulders which are identical and which are each made of a resistor and a capacitor with variable capacity connected in series, said capacitors with variable capacity being formed by the electrodes of the tachometer stator and by at least one pole of the rotor thereof which is connected, through a capacitor with fixed capacity defined by the surface of the rotor of said asynchronous motor and by the wall of the body of the viscosity sensor, to one of the poles of the supply bridge of the generator, the other pole of the generator being galvanically connected to the common point of the resistors of the different shoulders of the AC bridge and the other ends of the resistors being connected to the inputs of a phase-sensitive converter.

2. A device in accordance with claim 1, *characterized in that* said generator is connected to said resistors through a potentiometer.

3. A device in accordance with claim 1, *characterized in that* said generator is made controllable by output signal frequency and amplitude.

4. A device in accordance with claim 1, *characterized in that* said information-signal generation unit includes a low-pass filter and an amplifier connected in series, the input of said low-pass filter being connected to the output of a phase-sensitive converter.

5. A device in accordance with claim 1, *characterized in that* it includes a temperature control system made in the form of a thermostat connected to a temperature control chamber made in the body of said viscosity sensor, it further includes a digital multimeter which signal inputs are connected to said amplifier of said information-signal generation unit, a pressure sensor hydraulically connected to said high-pressure pump, and a sensor of temperature of flowing media in said measuring chamber, the outputs of said digital multimeter being connected to a

controlled power source of the stator, to said asynchronous motor, to said high-pressure pump and to said thermostat with the possibility of controlling, respectively, rotational frequency of the rotor of said asynchronous motor, pressure and temperature of flowing media in said measuring chamber.

6. A viscosity sensor comprising a body with a measuring chamber, an asynchronous motor, the rotor of said asynchronous motor is installed on supports and is arranged in said measuring chamber connected to the inlet port and to the outlet port, characterized in that said body is made in the form of three portions: the central portion and two lateral portions, said central portion of the body includes the temperature control chamber of said temperature control system and the stator of said asynchronous motor, and said lateral portions of the body include the supports of the rotor of said asynchronous motor, the rotor of said tachometer being rigidly and galvanically connected to the rotor of the asynchronous motor and being arranged in the central portion of the body, and said supports are made with the possibility of electrically insulating the rotor from the body.

7. A sensor in accordance with claim 6, *characterized in that* the stator of the tachometer is made in the form of at least two electrodes galvanically isolated from each other and arranged opposite its rotor made with at least one pole arranged with the possibility of forming with said electrodes variable capacities modulated by said pole when the tachometer rotor rotates.

8. A sensor in accordance with claim 6, *characterized in that* the central portion of the body is made of a chemically inactive and non-magnetic material with low conductance.

9. A sensor in accordance with claim 6, *characterized in that* the rotor of the asynchronous motor is made of a chemically inactive and non-magnetic material with low density and high conductance.

10. A sensor in accordance with claim 6, *characterized in that* in case of making the tachometer rotor with two or more poles the angular dimension of each of them is made equal to the angular dimension of the gaps therebetween.

11. A sensor in accordance with claim 6, *characterized in that* each electrode is made in the form of two groups of plates galvanically connected between them.

12. A sensor in accordance with claim 6, *characterized in that* said gaps between said poles of the tachometer rotor are filled with a dielectric material with the possibility of making a cylindrical form.

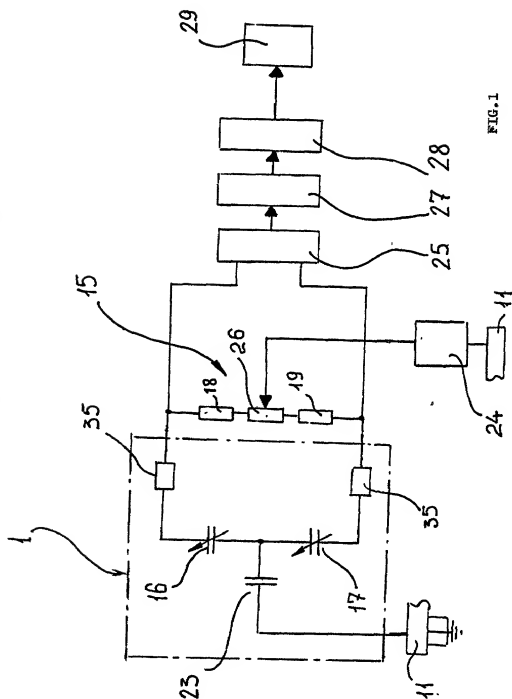
13. A method for manufacturing electrodes of a tachometer, consisting in making, on the stator, said electrodes in the form of combs, the prongs of one of them being arranged in the gaps between the prongs of another one, *characterized in that* said electrodes are made in the form of foil which is attached to a polymer film, the surface of said electrodes is covered with a chemically protective substance, afterwards the surface of the film with the foil attached thereto is treated by etching, afterwards the electrodes are insulated by thermally bonding thereto a film of a hermetic dielectric material, afterwards the two-layer film with said electrodes is rolled up to get the tachometer stator of cylindrical form.

14. A method in accordance with claim 13, *characterized in that* the boundary areas of said film are connected to each other after making said stator of cylindrical form.

15. A method in accordance with claim 13, *characterized in that* said boundary areas of said film are connected by overlapping or butting them.

16. A method in accordance with claim 13, *characterized in that* a polymer compound is used as said dielectric material.

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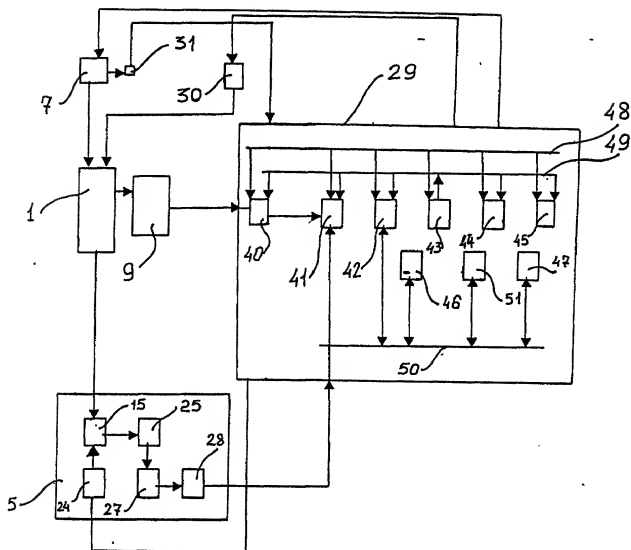
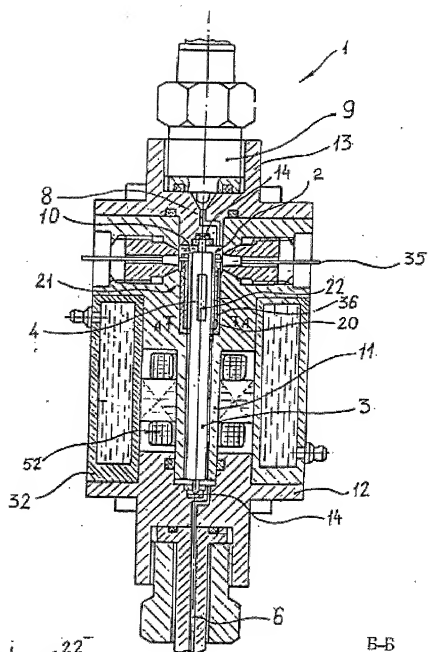


FIG. 2



A-A

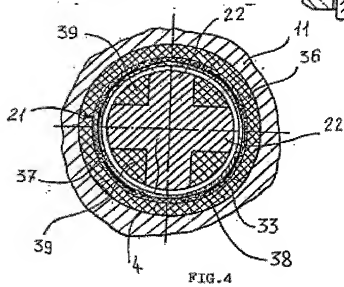


FIG. 4

B-B

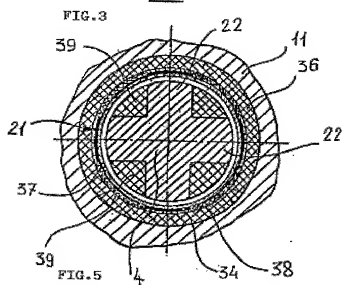


FIG. 5

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проживающему или имеющему главное место бизнеса по адресу

residing or having a principal place of business at Russia, 113114, Moscow, ul. Letnikovskaya, d. 5, str.2

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ИЗГОТОВЛЕНИЯ ЭЛЕКТРОДОВ ТАХОМЕТРА
ДАТЧИКА ВЯЗКОСТИ

DEVICE FOR MEASURING THE VISCOSITY OF
FLOWING MEDIA, VISCOSITY SENSOR AND
METHOD FOR MANUFACTURING THE
ELECTRODES OF A TACHOMETER FOR SAID
VISCOSITY SENSOR

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ASSIGNOR further covenants that ASSIGNEE will, upon its request, be provided promptly with all pertinent facts, documents relating to said invention and said Letters Patent and legal equivalents as may be known and accessible to ASSIGNOR and will testify as to the same in any interference, litigation, or proceeding related thereto and will promptly execute and deliver to ASSIGNEE or its legal representatives any and all papers, instruments or affidavits required to apply for, obtain, maintain, issue, and enforce said application, said invention, and said Letters Patent and that said equivalents thereof which may be necessary or desirable to carry out the purpose thereof.

IN WITNESS WHEREOF, I/We have signed this

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в Пятый день месяца мая 2001 года

05 May, 2001.

ORLOV Oleg Fedorovich

Имя / Name

Подпись / Signature

Занимаемое положение (если относится к делу) / Title (if applicable)

NENASHEV Alexandr Vasilevich

Имя / Name

Подпись / Signature

Занимаемое положение (если относится к делу) / Title (if applicable)

BERG Vladimir Ivanovich

Имя / Name

Подпись / Signature

Занимаемое положение (если относится к делу) / Title (if applicable)

ЗАЯВЛЕНИЕ О ПОДАЧЕ ЗАЯВКИ НА ПАТЕНТ
SUBSTITUTE DECLARATION AND POWER OF ATTORNEY IN PATENT APPLICATION

Attorney Docket No.: _____

Я, нижеподписавший изобретатель, настоящим заявляю, что:

As a below named inventor, I hereby declare:

моё местожительство, почтовый адрес и гражданство действительно те, что указаны ниже рядом с моим именем и фамилией, и что:

My residence, post office address and citizenship are as stated below next to my name.

полагаю, что являюсь истинным, первым и единственным изобретателем (если ниже указано только одно имя) или истинным, первым и единственным со-изобретателем (если ниже указаны несколько имён) заявляемого изобретения, в отношении которого испрашивается патент, названного:

I believe I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are listed below) of the subject matter that is claimed and for which a patent is sought on the invention entitled:

**УСТРОЙСТВО ДЛЯ ИЗМЕРЕНИЯ ВЯЗКОСТИ
ТЕКУЧИХ СРЕД, ДАТЧИК ВЯЗКОСТИ И
СПОСОБ ИЗГОТОВЛЕНИЯ ЭЛЕКТРОДОВ
ТАХОМЕТРА ДАТЧИКА ВЯЗКОСТИ**

**DEVICE FOR MEASURING THE VISCOSITY
OF FLOWING MEDIA, VISCOSITY SENSOR
AND METHOD FOR MANUFACTURING THE
ELECTRODES OF A TACHOMETER FOR SAID
VISCOSITY SENSOR**

описание которого
the specification of which

приложено к нему
is attached hereto.

было подано _____ как заявка США номер (или Международная заявка PCT номер)
_____ поправки внесены (дата, если это применимо)
was filed on _____ as U.S. Application Serial No. (or PCT International Application No.)
_____ and was amended on _____ (if applicable).

Настоящим заявляю, что я прочёл и понимаю содержание вышеобозначенного описания, включая заявленное изобретение с учётом любых вышеупомянутых поправок.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

Я признаю, что согласно §1.56, Титул 37, Свод Федеральных Правил, моим долгом является представить информацию, существенную для рассмотрения данной заявки.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, 1.56.

Настоящим притязую на привилегии иностранного приоритета, согласно §119(a)-(d), Титул 35, Кодекс Соединённых Штатов, или Раздел 365(b) испрашиваемого на нижеподписанный патент или свидетельство изобретателя, или Раздел 365(a) на Международную заявку PCT, а также указываю ниже все иностранные заявки на патент или свидетельство изобретателя с датой подачи более ранней, чем та, на которую заявляется приоритет:

I hereby claim foreign priority benefits under Title 35, United States Code, 119(a)-(d) or Section 365(b), of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT international application designated at least one country other than United States listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Предшествующая иностранная заявка
Prior foreign application

98121868

RU

07/12/98

Номер
Number

Страна
Country

День/месяц/год подачи
Day/Month/Year Filed

Притязание на приоритет
Priority Claimed

Да
Yes

Нет
No

Согласно §119(e), раздел 35, Кодекс Соединённых Штатов
настоящим притязано на ниженазванный приоритет в
Соединённых Штатах.

I hereby claim the benefit under Title 35, United
States Code Section 119(e) of any United States
provisional application(s) listed below.

Application No.

Filing Date

Согласно §120, раздел 35, или §365(c), Кодекса Законов
Соединённых Штатов настоящим притязано на
ниженазванный приоритет и, поскольку предмет каждого
из притязаний данной заявки не был раскрыт в
предшествующих заявках Соединённых Штатов или
Международных заявок, поданных в соответствии с PCT с
указанием Соединённых Штатов, перечисленных ниже
путём, предусмотренным первым параграфом §112, Титул
35, Кодекс Соединённых Штатов, я признаю, что согласно
§1.56, Титул 37, Свод Федеральных Правил, моим долгом
является представить информацию, существенную для
рассмотрения данной заявки, которая возникнет в период
между подачей предшествующей заявки и датой
национальной или международной заявки PCT:

I hereby claim the benefit under Title 35, United
States Code, Section 120 of any United States
application(s), or Section 365(c) of any PCT
international application designating the United
States listed below, and, insofar as the subject matter
of each of the claims of this application is not
disclosed in the prior United States or PCT
international application in the manner provided by
the first paragraph of Title 35, United States Code,
112, I acknowledge the duty to disclose material to
patentability as defined in Title 37, Code of Federal
Regulations, 1.56, which became available between
the filing date of the prior application and the
national or PCT international filing date of this
application:

Заявка номер

Дата

Статус: патент выдан, в рассмотрении, не востребован.

Application No.

Filing Date

Status: Patented/Pending/Abandoned

PCT/RU99/00470

07/12/1999

Pending

Являясь ниженазванным изобретателем, настоящим
назначаю следующих патентных поверенных для ведения
данной заявки и осуществления всех дел в Агентстве по
Патентам и Товарным Знакам Соединённых Штатов. Всю
корреспонденцию и телефонные звонки направлять:

I hereby appoint the attorneys associated with
Customer No.000996 to prosecute this application
and to transact all business in the United States
Patent and Trademark Office connected therewith.
Address all correspondence and phone calls to:

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Настоящим заявляю, что все утверждения, сделанные здесь, насколько мне известно правдивы, и что что все заявления основаны на информации и убеждениях, которые я полагаю правдивыми; и далее, что эти утверждения сделаны со знанием, что намеренные ложные утверждения и им подобное наказуемы штрафом или тюремным заключением, или обоими, согласно Раздела 1001, Титул 18, Кодекс Соединённых Штатов, и что такие намеренно ложные утверждения могут подорвать ценность заявки или любого патента по ней выданного.

I hereby further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Полное имя/фамилия изобретателя

Full name of inventor

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Подпись изобретателя

Inventor's signature

Date May 05, 2001

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000576652.000001